

# **ABSTRACT**

A process for designing and manufacturing precision-  
folded, high strength, fatigue-resistant structures and a  
sheet therefore. The techniques include methods for  
5 precision bending of a sheet of material (41, 241, 341,  
441, 541) along a bend line (45, 245, 345, 445, 543) and a  
sheet of material formed with bending strap-defining  
structures, such as slits or grooves (43, 243, 343, 443,  
10 542), are disclosed. Methods include steps of designing  
and then separately forming longitudinally extending slits  
or grooves (43, 243, 343, 443, 542) through the sheet of  
material in axially spaced relation to produce precise  
bending of the sheet (41, 241, 341, 441, 541) when bent  
15 along the bend line (45, 245, 345, 445, 543). The bending  
straps have a configuration and orientation which  
increases their strength and fatigue resistance, and most  
preferably slits or arcs are used which causes edges (257,  
457) to be engaged and supported on faces (255, 455) of  
20 the sheet material on opposite sides of the slits or arcs.  
The edge-to-face contact produces bending along a virtual  
fulcrum position in superimposed relation to the bend line  
(45, 245, 345, 445, 543). Several slit embodiments (43,  
243, 343, 443, 542) suitable for producing edge-to-face  
25 engagement support and precise bending are disclosed, as  
is the use of the slit sheets to produce various three-  
dimensional structures and to enhance various design and  
fabrication techniques.